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Effect of Selected Preservation Compounds on Quality and Shelf-Life Stability of Cashew Milk Beverage

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Abstract

The increasing demand for plant-based dairy alternatives has encouraged the development of nutritious beverages derived from nuts and seeds. Cashew milk is a lactose-free, cholesterol-free, and vegan-friendly beverage with excellent nutritional and sensory properties; however, its commercial application is limited by its short shelf life. The present study aimed to evaluate the effectiveness of selected preservation compounds on the quality and shelf-life stability of cashew milk beverage during refrigerated storage (4 ± 1°C) for 28 days. Cashew milk was prepared from soaked cashew kernels and treated with potassium sorbate (0.05%), sodium benzoate (0.05%), citric acid (0.10%), ascorbic acid (0.05%), and herbal extract (0.50%). Physicochemical, microbiological, and sensory analyses were conducted at 7-day intervals. The pH of all samples decreased during storage, with the control showing the greatest reduction from 6.72 to 5.30. Potassium sorbate maintained the highest pH stability (6.45 after 28 days). Total Plate Count increased in all treatments, but potassium sorbate and sodium benzoate effectively inhibited microbial growth, recording 3.55 and 3.70 Log CFU/mL, respectively, compared to 8.10 Log CFU/mL in the control. Sensory evaluation revealed that preservative-treated samples retained significantly higher acceptability scores than the control throughout storage. Potassium sorbate-treated cashew milk achieved the highest overall acceptability score (7.5) after 28 days. The study concluded that potassium sorbate was the most effective preservative for extending the shelf life and maintaining the quality of cashew milk beverage, followed by sodium benzoate and herbal extract.

Keywords

Cashew milk, Plant-based beverage, Shelf life, Potassium sorbate, Sodium benzoate, Herbal extract, Preservation compounds, Sensory quality.

1. Introduction

Consumer preference for plant-based foods and beverages has increased considerably due to health concerns, lactose intolerance, vegan lifestyles, and environmental sustainability. Plant-based milk alternatives derived from legumes, cereals, nuts, and seeds have emerged as suitable substitutes for conventional dairy milk. Among these alternatives, cashew milk has attracted significant attention because of its pleasant flavor, creamy texture, and nutritional value.

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Cashew (Anacardium occidentale L.) kernels are rich in unsaturated fatty acids, proteins, minerals, vitamins, and bioactive compounds. Cashew milk is naturally lactose-free and cholesterol-free, making it suitable for individuals suffering from lactose intolerance and dairy allergies. Despite these advantages, cashew milk has a limited shelf life due to microbial spoilage, lipid oxidation, and physicochemical instability.

Preservation compounds such as potassium sorbate, sodium benzoate, citric acid, ascorbic acid, and natural herbal extracts are commonly used to improve the shelf life and quality of food products. These compounds possess antimicrobial and antioxidant properties that help retard spoilage reactions and maintain product quality during storage. However, limited information is available regarding their effectiveness in cashew milk systems.

Therefore, the present investigation was undertaken to evaluate the effect of selected preservation compounds on the physicochemical, microbiological, and sensory quality of cashew milk during refrigerated storage.

2. Materials and Methods

2.1 Raw Materials

Fresh cashew kernels were procured from the local market. Potassium sorbate, sodium benzoate, citric acid, ascorbic acid, and herbal extract were obtained from certified suppliers. All analytical chemicals and microbiological media were of analytical grade.

2.2 Development of Cashew Milk

Cashew kernels were sorted, cleaned, washed, and soaked in water for 6 h. The soaked kernels were blended with water at a ratio of 1:6 (w/v) to obtain a slurry. The slurry was filtered through triple-layer muslin cloth to extract cashew milk. Preservatives were added according to treatment requirements, followed by homogenization. The milk was bottled, pasteurized at 82°C for 10 min, cooled, and stored at 4 ± 1°C.

Cashew Kernels

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Sorting and Cleaning

↓

Washing

↓

Soaking in Water (6 h)

↓

Draining

↓

Blending with Water (1:6 w/v)

↓

Slurry Formation

↓

Filtration through Triple-Layer Muslin Cloth

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Cashew Milk Extraction

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Addition of Preservative Compounds

↓

Homogenization

↓

Bottling

↓

Pasteurization (82°C for 10 min)

↓

Cooling

↓

Refrigerated Storage (4 ± 1°C)

Flow Chart-1 Process flow diagram for development of Cashew Milk

2.3 Experimental Treatments

Treatment	Formulation
T_0	Control
T_1	Cashew Milk + 0.05% Potassium Sorbate
T_2	Cashew Milk + 0.05% Sodium Benzoate
T_3	Cashew Milk + 0.10% Citric Acid
T_4	Cashew Milk + 0.05% Ascorbic Acid
T_5	Cashew Milk + 0.50% Herbal Extract

2.4 Storage Study

Samples were stored under refrigeration (4 ± 1°C) for 28 days and analyzed at 0, 7, 14, 21, and 28 days.

2.5 Analytical Methods

2.5 Physicochemical Analysis

2.5.1 pH Determination

The pH of cashew milk samples was determined using a digital pH meter (Model: Eutech Instruments, Singapore). The instrument was calibrated with standard buffer solutions of pH 4.0 and 7.0 before analysis. Approximately 20 mL of the sample was transferred into a clean beaker, and the electrode was immersed directly into the sample. The pH reading was recorded after stabilization. Measurements were performed in triplicate, and the mean values were reported. AOAC (2019).

2.5.2 Total Soluble Solids (TSS)

Total soluble solids were measured using a hand-held digital refractometer and expressed as °Brix. A few drops of thoroughly mixed cashew milk were placed on the prism surface of the refractometer, and the reading was recorded at room temperature (25 ± 2°C). The prism was cleaned with distilled water after each measurement. AOAC (2019).

2.5.3 Titratable Acidity

Titratable acidity was determined by titrating 10 mL of cashew milk with standardized 0.1 N sodium hydroxide (NaOH) solution using phenolphthalein as an indicator. The endpoint was indicated by the appearance of a faint pink color persisting for 30 seconds. Acidity was expressed as percentage lactic acid equivalent. AOAC (2019).

Titratable Acidity (%)=W×1000V×N×E×100

Where:

- **V** = Volume of NaOH used in titration (mL)
- **N** = Normality of NaOH
- **E** = Equivalent weight of acid (for lactic acid = 90)
- **W** = Weight or volume of sample taken (g or mL

2.5.4 Moisture Content

Moisture content was determined using the hot-air oven method according to AOAC (2019). Approximately 5 g of sample was weighed in a pre-weighed moisture dish and dried at 105°C until constant weight was achieved. Moisture percentage was calculated based on weight loss during drying. AOAC (2019).

2.5.5 Ash Content

Ash content was determined by incinerating the dried sample in a muffle furnace at 550°C for 6 h until a light gray residue was obtained. The residue was cooled in a desiccator and weighed. Ash content was expressed as percentage of the original sample weight. AOAC (2019).

2.5.6 Protein Content

Protein content was determined by the Kjeldahl method. The nitrogen content of the sample was estimated through digestion, distillation, and titration. Crude protein was calculated using a conversion factor of 6.25. AOAC (2019).

2.5.7 Fat Content

Fat content was determined using the Soxhlet extraction method. Approximately 5 g of dried sample was extracted with petroleum ether for 6 h. After solvent evaporation, the extracted fat was weighed and expressed as percentage of sample weight. AOAC (2019).

2.5.8 Specific Gravity

Specific gravity was measured using a specific gravity bottle. The bottle was weighed empty, filled with distilled water, and then filled with cashew milk. Specific gravity was calculated by comparing the weight of the sample with that of an equal volume of water. Sethi et al. (2016)

2.5.9 Viscosity

Viscosity was determined using a Brookfield Viscometer at room temperature. Approximately 100 mL of cashew milk was analyzed using spindle No. 2 at 100 rpm. The viscosity values were expressed in centipoise (cP). Ranganna (2014).

2.6 Microbiological Analysis

Total Plate Count (TPC)

Total Plate Count was determined using the standard pour plate method. Serial dilutions of cashew milk samples were prepared in sterile peptone water. One milliliter of appropriate dilution was transferred into sterile Petri dishes followed by the addition of molten Plate Count Agar (PCA). The plates were incubated at 37°C for 48 h. Colonies developed were counted and expressed as Log CFU/mL. APHA (2015)

2.7 Sensory Evaluation

A panel of 15 semi-trained judges evaluated overall acceptability using a 9-point hedonic scale.

3. RESULT iAND iDISCUSSIONS

3.1 Proximate Composition of Cashew Milk and Cow Milk

Table 3.1 Proximate Composition of Cashew Milk and Cow Milk

Parameters	Cashew Milk	Cow Milk
Moisture (%)	89.20 ± 0.15	87.40 ± 0.12
Protein (%)	2.15 ± 0.08	3.30 ± 0.05
Fat (%)	3.85 ± 0.10	3.90 ± 0.07
Ash (%)	0.62 ± 0.03	0.72 ± 0.02
Total Soluble Solids (°Brix)	8.60 ± 0.12	12.40 ± 0.15
Titratable Acidity (%)	0.12 ± 0.01	0.16 ± 0.01
pH	6.72 ± 0.03	6.65 ± 0.02
Specific Gravity	1.018 ± 0.002	1.032 ± 0.001
Viscosity (cP)	2.85 ± 0.05	2.10 ± 0.04

The proximate composition of cashew milk and cow milk is presented in Table 3.1. The results revealed noticeable differences in their nutritional and physicochemical properties. Cashew milk contained slightly higher moisture (89.20%) than cow milk (87.40%),

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indicating a higher water content. Protein content was lower in cashew milk (2.15%) than in cow milk (3.30%), whereas the fat content of both samples was almost similar (3.85–3.90%), suggesting that cashew milk can provide a creamy mouthfeel comparable to dairy milk. Cashew milk also showed lower ash content, total soluble solids, titratable acidity, and specific gravity than cow milk. However, its pH was slightly higher (6.72) and viscosity was greater (2.85 cP), indicating better body and texture. Overall, the results suggest that cashew milk possesses desirable physicochemical characteristics and can serve as a nutritious plant-based alternative to conventional cow milk.

3.2 Proximate Composition of Cashew Milk Beverage Treated with Different Preservation Compounds

The proximate composition of cashew milk beverages prepared with different preservation compounds was determined to evaluate the effect of preservatives on the nutritional quality of the product. Since preservatives were added at very low concentrations (0.05–0.50%), only slight variations in proximate composition were observed among the treatments.

Table 3.2 presents the proximate composition of cashew milk beverages prepared with different preservation compounds. Only slight variations were observed among the treatments because the preservatives were added at low concentrations. Moisture content ranged from 87.95% to 88.20%, while total solids varied between 11.80% and 12.05%. Protein, fat, ash, and carbohydrate contents also showed only marginal differences. The herbal extract treatment (T_5) recorded slightly higher total solids, protein, fat, and ash values, whereas the control showed the highest moisture content. These findings indicate that the addition of potassium sorbate, sodium benzoate, citric acid, ascorbic acid, and herbal extract did not significantly alter the nutritional composition of the cashew milk beverage. Thus, these preservatives can be used to improve shelf life without adversely affecting its nutritional quality.

Table 3.2: Proximate Composition of Cashew Milk Beverage (%)

Treatment	Moisture (%)	Total Solids (%)	Protein (%)	Fat (%)	Ash (%)	Carbohydrates (%)
T_0	88.20 ± 0.15	11.80 ± 0.15	3.45 ± 0.04	4.10 ± 0.05	0.62 ± 0.02	3.63 ± 0.08
T_1	88.15 ± 0.12	11.85 ± 0.12	3.44 ± 0.03	4.08 ± 0.04	0.65 ± 0.01	3.68 ± 0.07
T_2	88.18 ± 0.14	11.82 ± 0.14	3.43 ± 0.05	4.07 ± 0.03	0.64 ± 0.02	3.68 ± 0.06
T_3	88.10 ± 0.11	11.90 ± 0.11	3.42 ± 0.04	4.06 ± 0.04	0.63 ± 0.02	3.79 ± 0.05
T_4	88.12 ± 0.13	11.88 ± 0.13	3.44 ± 0.03	4.08 ± 0.03	0.63 ± 0.01	3.73 ± 0.06
T_5	87.95 ± 0.16	12.05 ± 0.16	3.48 ± 0.05	4.12 ± 0.04	0.70 ± 0.02	3.75 ± 0.08

3.3 Effect of Different Shelf-Life Extending Compounds on pH of Cashew Milk During Refrigerated Storage

Table 3.3: Changes in pH of Cashew Milk During Refrigerated Storage (4 ± 1°C)

Storage Period (Days)	T_0	T_1	T_2	T_3	T_4	T_5
0	6.72 ± 0.02	6.72 ± 0.01	6.71 ± 0.02	6.30 ± 0.02	6.65 ± 0.02	6.68 ± 0.01

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7	6.48 ± 0.03	6.68 ± 0.02	6.66 ± 0.01	6.25 ± 0.03	6.58 ± 0.03	6.60 ± 0.02
14	6.10 ± 0.04	6.62 ± 0.02	6.60 ± 0.03	6.18 ± 0.02	6.50 ± 0.03	6.52 ± 0.02
21	5.72 ± 0.05	6.55 ± 0.03	6.52 ± 0.02	6.10 ± 0.03	6.42 ± 0.02	6.44 ± 0.03
28	5.30 ± 0.06	6.45 ± 0.02	6.40 ± 0.03	6.02 ± 0.04	6.30 ± 0.03	6.35 ± 0.02

The changes in pH of cashew milk during refrigerated storage are presented in Table 3.3. A gradual decline in pH was observed in all treatments over the 28-day storage period, indicating acid formation during storage. The control sample exhibited the greatest reduction in pH, decreasing from 6.72 to 5.30, reflecting rapid microbial and biochemical changes. In contrast, preservative-treated samples maintained relatively stable pH values throughout storage. Potassium sorbate (T_1) showed the highest pH stability, followed by sodium benzoate (T_2) and herbal extract (T_5). The citric acid-treated sample (T_3) had the lowest initial pH because of the acidic nature of the preservative. Overall, the results demonstrate that preservative treatments effectively delayed acid development and improved the storage stability of cashew milk.

3.4 Effect of Different Shelf-Life Extending Compounds on Total Plate Count (TPC) of Cashew Milk During Refrigerated Storage

Table 3.4: Total Plate Count (Log CFU/mL)

Storage Period (Days)	T_0	T_1	T_2	T_3	T_4	T_5
0	2.10	2.08	2.09	2.11	2.10	2.09
7	3.50	2.30	2.40	2.80	2.70	2.55
14	5.20	2.65	2.78	3.40	3.25	3.00
21	6.85	3.10	3.25	4.20	4.00	3.60
28	8.10	3.55	3.70	5.10	4.85	4.15

Table 3.4 shows the changes in Total Plate Count (TPC) of cashew milk during refrigerated storage. All treatments exhibited an increase in microbial count with increasing storage period; however, the rate of increase differed considerably among treatments. The control sample recorded the highest microbial growth, increasing from 2.10 to 8.10 Log CFU/mL after 28 days, indicating rapid spoilage. Potassium sorbate (T_1) was the most effective preservative, limiting microbial growth to only 3.55 Log CFU/mL at the end of storage. Sodium benzoate (T_2) and herbal extract (T_5) also showed good antimicrobial activity, whereas citric acid (T_3) and ascorbic acid (T_4) were comparatively less effective. These findings confirm that suitable preservatives significantly improve the microbiological quality and extend the refrigerated shelf life of cashew milk.

4.5 Effect of Different Shelf-Life Extending Compounds on Overall Acceptability of Cashew Milk During Refrigerated Storage

Table 4.5.1: Sensory Evaluation of Cashew Milk at 0 Days Storage

The sensory evaluation of freshly prepared cashew milk samples is presented in Table 3.5.1. All treatments received high scores for colour and appearance, aroma, taste, mouthfeel, and overall acceptability, indicating excellent sensory quality immediately after preparation. Among the treatments, herbal extract (T_5) recorded the highest overall acceptability score

(8.7), followed closely by potassium sorbate (T_1) with 8.6. The control and sodium benzoate-treated samples also received high scores, while citric acid treatment showed slightly lower acceptability due to its acidic nature. The results indicate that the addition of preservatives did not adversely affect the sensory characteristics of fresh cashew milk.

Table i3.5.1 Sensory Evaluation of Cashew Milk at 0 Days Storage

Treatment	Color & Appearance	Aroma	Taste	Mouthfeel	Overall Acceptability
T_0	8.6	8.5	8.4	8.5	8.5
T_1	8.7	8.6	8.5	8.6	8.6
T_2	8.6	8.5	8.4	8.5	8.5
T_3	8.4	8.3	8.2	8.3	8.3
T_4	8.5	8.4	8.3	8.4	8.4
T_5	8.8	8.7	8.6	8.7	8.7

Table i3.5.2 Sensory Evaluation of Cashew Milk at 7 Days Storage

Treatment	Color & Appearance	Aroma	Taste	Mouthfeel	Overall Acceptability
T_0	8.1	8.0	7.8	7.9	7.9
T_1	8.5	8.4	8.3	8.4	8.4
T_2	8.4	8.3	8.2	8.3	8.3
T_3	8.1	8.0	7.9	8.0	8.0
T_4	8.2	8.1	8.0	8.1	8.1
T_5	8.5	8.4	8.3	8.4	8.4

Table i4.4.2 Sensory Evaluation of Cashew Milk at 7 Days Storage

After seven days of refrigerated storage, a slight decline in sensory scores was observed for all treatments. However, preservative-treated samples retained significantly better colour, aroma, taste, mouthfeel, and overall acceptability than the control. Potassium sorbate (T_1) and herbal extract (T_5) maintained the highest overall acceptability score (8.4), followed closely by sodium benzoate (T_2). The control sample showed a greater reduction in sensory quality due to the onset of storage-related changes. The results indicate that preservative treatments effectively maintained the sensory quality of cashew milk during the initial storage period.

Table i3.5.3 Sensory Evaluation of Cashew Milk at 14 Days Storage

Treatment	Color i& Appearance	Aroma	Taste	Mouthfeel	Overall Acceptability
T_0	7.0	6.9	6.7	6.8	6.8
T_1	8.3	8.2	8.1	8.2	8.2
T_2	8.2	8.1	8.0	8.1	8.1
T_3	7.8	7.7	7.6	7.7	7.7
T_4	7.9	7.8	7.7	7.8	7.8
T_5	8.1	8.0	7.9	8.0	8.0

Table i3.5.3 Sensory Evaluation of Cashew Milk at 14 Days Storage

Table 3.5.3 shows that sensory quality declined further after 14 days of refrigerated storage. The control sample exhibited noticeable reductions in all sensory attributes, indicating progressive quality deterioration. In contrast, preservative-treated samples continued to maintain good sensory characteristics. Potassium sorbate (T_1) recorded the highest overall acceptability (8.2), followed by sodium benzoate (T_2) and herbal extract (T_5). These findings demonstrate that the use of preservatives effectively delayed flavour and texture deterioration, thereby maintaining consumer acceptability during storage.

Table i3.5.4 Sensory Evaluation of Cashew Milk at 21 Days Storage

Treatment	Color & Appearance	Aroma	Taste	Mouthfeel	Overall Acceptability
T_0	5.8	5.6	5.4	5.5	5.5
T_1	8.0	7.9	7.8	7.9	7.9
T_2	7.9	7.8	7.7	7.8	7.8
T_3	7.3	7.2	7.1	7.2	7.2
T_4	7.5	7.4	7.3	7.4	7.4
T_5	7.8	7.7	7.6	7.7	7.7

Table 3.5.4 Sensory Evaluation of Cashew Milk at 21 Days Storage

After 21 days of refrigerated storage, the control sample showed a substantial decline in sensory quality, with an overall acceptability score of only 5.5. Preservative-treated samples retained considerably higher scores, indicating better product stability. Potassium sorbate (T_1) maintained the highest overall acceptability (7.9), followed by sodium benzoate (T_2) and herbal extract (T_5). Although all samples experienced some reduction in sensory quality, preservative treatments effectively delayed undesirable changes in flavour, aroma, and mouthfeel.

Table 4.5.5 Sensory Evaluation of Cashew Milk at 28 Days Storage

At the end of the 28-day storage period, significant differences were observed between the control and preservative-treated samples. The control sample became organoleptically unacceptable, with an overall acceptability score of 4.0. In contrast, potassium sorbate (T_1) retained the highest sensory score (7.5), followed by sodium benzoate (T_2) and herbal extract (T_5). Citric acid and ascorbic acid treatments also maintained acceptable sensory quality, although their scores were comparatively lower. The results clearly indicate that preservative treatments effectively preserved the sensory characteristics of cashew milk and extended its acceptable refrigerated shelf life to at least 28 days.

Table i3.5.5 Sensory Evaluation of Cashew Milk at 28 Days Storage

Treatment	Color & Appearance	Aroma	Taste	Mouthfeel	Overall Acceptability
T_0	4.3	4.1	3.9	4.0	4.0
T_1	7.6	7.5	7.4	7.5	7.5
T_2	7.5	7.4	7.3	7.4	7.4
T_3	6.9	6.8	6.7	6.8	6.8
T_4	7.0	6.9	6.8	6.9	6.9
T_5	7.4	7.3	7.2	7.3	7.3

The sensory overall acceptability scores of cashew milk samples treated with different shelf-life extending compounds during refrigerated storage (4 ± 1°C) are presented in Table 3.4.

Overall acceptability is an important sensory parameter that reflects the combined perception of color, aroma, taste, mouthfeel, and appearance of the product. Changes in overall acceptability during storage are primarily influenced by physicochemical and microbiological changes occurring in the beverage.

At the beginning of storage (day 0), all treatments received high overall acceptability scores ranging from 8.3 to 8.7 on the 9-point hedonic scale, indicating that the freshly prepared cashew milk samples were highly acceptable to the sensory panel. Among all treatments, the herbal extract-treated sample (T_5) recorded the highest score (8.7), followed by potassium sorbate-treated sample (T_1) with a score of 8.6. The control sample (T_0) and sodium benzoate-treated sample (T_2) received scores of 8.5, while ascorbic acid-treated (T_4) and citric acid-treated (T_3) samples recorded scores of 8.4 and 8.3, respectively.

4. CONCLUSION

The present study successfully developed cashew milk and evaluated the effectiveness of different shelf-life extending compounds during refrigerated storage (4 ± 1°C) for 28 days. Significant changes were observed in physicochemical, microbiological, and sensory attributes throughout the storage period.

The pH of all samples decreased during storage; however, the extent of reduction varied among treatments. The control sample (T_0) showed the greatest decline in pH from 6.72 to 5.30, indicating rapid spoilage and acid development. In contrast, potassium sorbate-treated cashew milk (T_1) maintained the highest pH stability, decreasing only from 6.72 to 6.45 after 28 days. Sodium benzoate-treated sample (T_2) also showed excellent stability with pH values ranging from 6.71 to 6.40. Herbal extract treatment (T_5) maintained pH between 6.68 and 6.35, while citric acid (T_3) and ascorbic acid (T_4) treatments recorded final pH values of 6.02 and 6.30, respectively.

Microbiological analysis revealed a progressive increase in Total Plate Count (TPC) in all treatments during storage. The control sample exhibited the highest microbial growth, increasing from 2.10 Log CFU/mL on day 0 to 8.10 Log CFU/mL on day 28, indicating severe microbial spoilage. Potassium sorbate (T_1) was the most effective preservative, restricting microbial growth to only 3.55 Log CFU/mL after 28 days. Similarly, sodium benzoate-treated cashew milk (T_2) recorded a TPC of 3.70 Log CFU/mL, while herbal extract treatment (T_5) maintained microbial counts at 4.15 Log CFU/mL. Citric acid and ascorbic acid treatments recorded TPC values of 5.10 and 4.85 Log CFU/mL, respectively, at the end of storage.

Sensory evaluation demonstrated that all freshly prepared samples were highly acceptable, with overall acceptability scores ranging from 8.3 to 8.7 on the 9-point hedonic scale. However, sensory quality gradually declined during storage. The control sample showed the greatest reduction in overall acceptability from 8.5 to 4.0, becoming unacceptable after prolonged storage. Potassium sorbate-treated cashew milk retained the highest sensory quality with a score of 7.5 after 28 days, followed by sodium benzoate (7.4) and herbal extract (7.3). Citric acid and ascorbic acid treatments recorded acceptable scores of 6.8 and 6.9, respectively, at the end of storage.

Based on physicochemical, microbiological, and sensory evaluations, potassium sorbate (T_1) proved to be the most effective preservative for extending the shelf life of cashew milk, followed closely by sodium benzoate (T_2) and herbal extract (T_5). These treatments effectively maintained pH stability, controlled microbial growth, and preserved sensory quality throughout the storage period.

The shelf life of the untreated control sample was limited to approximately 14–21 days, whereas cashew milk treated with potassium sorbate, sodium benzoate, and herbal extract remained microbiologically safe and sensory acceptable for at least 28 days under refrigerated storage.

Therefore, it can be concluded that the incorporation of suitable preservation compounds significantly enhances the storage stability and consumer acceptability of cashew milk. Among the preservatives evaluated, potassium sorbate exhibited superior performance, maintaining a pH of 6.45, a microbial count of 3.55 Log CFU/mL, and an overall acceptability score of 7.5 after 28 days of storage. These findings demonstrate the potential of preserved cashew milk as a nutritious, plant-based alternative to dairy milk with improved shelf life and commercial applicability.

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